

EDITORIALS

Utah Joins the *WJM* Family

THE WESTERN JOURNAL OF MEDICINE welcomes the Utah State Medical Association to the growing family of western state medical associations which have recognized *WJM* as their official journal. This was accomplished by an action of the USMA House of Delegates at their 1979 meeting, and beginning with this issue the members of USMA will receive *WJM* as a regular benefit of their membership. This will be in the form of a special UTAH EDITION which contains a special section for USMA readers in addition to the usual content of the journal. This special section is prepared by USMA and is under the direction of a Special Editor for Utah. It will provide a forum for communication between the association and its members.

The *WJM* seeks to be a truly useful journal for its readers, the greatest number of whom are practitioners. It seeks to offer a variety of fare which also will include something of interest for students, academicians, researchers and even political leaders of our profession—of whom there are many among its readers. It seeks to reflect the vitality and achievements in science, education and practice that are hallmarks of medicine in the West, and to give these a stronger presence in the medical literature. The editors, the editorial board and many others are dedicated to making this journal a regional instrument of physician education and continuing education in the West, and also an increasingly distinguished journal on the national scene.

The medical profession in Utah has much to contribute as well as to receive from the *WJM*. The University of Utah College of Medicine is of national renown in scholarship, and the state has many innovative leaders in medical practice and health care. It is hoped and expected that some of this scholarship and innovation will find expression in this journal.

We welcome USMA and look forward to a long and productive association which should be of great benefit to all concerned.

—MSMW

Mushroom Poisoning

IT IS SAFE to say that the incidence of mushroom poisoning is directly related to the prevalence of mushroom hunters. For this reason, mushroom toxicity has traditionally been a matter of greater concern in central and eastern Europe than in North America.

Before 1960 very few Americans gathered and ate wild mushrooms, but in the past 20 years there has been a great upsurge of interest in mushrooms in the United States. Thousands of enthusiasts now comb the woods in the summer and fall with field guides, baskets and digging tools. Some of these mushroom hunters are looking for “natural foods” or “natural highs”; others have simply discovered the fascination of a new hobby. While some are cautious and some are bold, a sense of gastronomic adventure pervades this activity, and mushroom poisoning is clearly on the rise.

The incidence of poisoning is difficult to ascertain because reporting is not mandated by law. The US Department of Agriculture Poison Fungus Center received reports of 105 cases with two fatalities in 1973, with only eight states reporting. However, in Colorado alone an average of 50 confirmed cases annually occurred over four years (1972 to 1975). This high incidence was disclosed through the combined efforts of the regional poison center, the Rocky Mountain Mushroom Club and the medical facilities in the state.¹ Therefore, it is likely that the true frequency for the nation as a whole is much higher than the reports suggest.

Approximately 5,000 species of fleshy mushrooms occur in the United States. Generously speaking, no more than 300 of these are likely to attract attention as potential items of food. Of these, approximately 100 species are known to be toxic, at least under some circumstances, and about a dozen are potentially lethal.

At least seven types of mushroom toxicity are known, and there are scattered reports of toxic reactions which fit none of the seven. Most toxicologic studies have been concerned with the most

dangerous varieties. Well over 90 percent of all fatal poisonings throughout the world have been due to a small number of closely related species of the genus *Amanita*. The European "death cap," *Amanita phalloides*, has been responsible for most of the deaths. This mushroom is now known to occur sporadically in the United States, possibly carried accidentally to this continent with the roots of imported ornamental trees.² Closely related native mushrooms include the widely distributed "destroying angels" *A virosa*, *A verna* and *A bisporigera*. All of these mushrooms contain amatoxins, a group of cyclic octapeptides which have been identified as the principal toxins.³ The amatoxins are thermostable. They are rapidly absorbed from the gastrointestinal tract and cleared by the liver, where they enter hepatocyte nuclei and irreversibly inhibit the enzyme RNA polymerase II, which results in hepatocellular necrosis. In large ingestions the amatoxins also cause renal tubular necrosis by a similar mechanism. A group of inconspicuous brown mushrooms of the genus *Galerina* also contain high concentrations of amatoxins and have occasionally caused fatal poisoning, especially in small children who often seem to be attracted to these little brown mushrooms.

Most of the fatal ingestions not related to the amatoxins have been caused by the false morels of the genera *Gyromitra* and *Helvella*. These contain gyromitrin which, on hydrolysis, releases monomethylhydrazine (MMH). Knowledge of the toxicity of this substance was rapidly advanced by work done at US aerospace centers because monomethylhydrazine has been used extensively as a propellant for rockets.⁴ Because MMH is very volatile, cooking may render those mushrooms nontoxic. This fact probably explains the reports, formerly attributed to folklore, that the cook who stirs the *Gyromitra* stew is more likely to become ill than the guests who eat it. The spectrum of toxicity for MMH resembles that of the drug isoniazid. Severe liver damage may occur, occasionally associated with renal failure. Monomethylhydrazine also interferes with the action of pyridoxine, although neurotoxicity is not usually a prominent feature of acute toxicity.

In Europe, severe renal failure has occurred after a latent period of from 5 to as long as 21 days after ingestion of *Cortinarius orellanus* or *Lepiota helveola*. No similar cases have been reported in the United States. However, these mush-

rooms occur in California, Oregon and Washington, and because of the long latent period the connection between ingestion and illness would be very easy to overlook. The nephrotoxic agents in these mushrooms are unknown.

Among the less life-threatening toxic mushrooms are the "fly agaric" *Amanita muscaria*, and the "panther" *A pantherina*, both of which contain ibotenic acid and muscimol. These indole derivatives induce a syndrome of alternating somnolence and agitation, with visual disturbances and, occasionally, seizures. Although formerly ranked among the serious forms of poisoning, it has become apparent that the illness, while spectacular, is rarely fatal.

Muscarine, once thought to be the major toxic principle in mushroom poisoning, is now known to be present in pharmacologically significant quantities only in a few species in the genera *Clitocybe* and *Inocybe*. The classic triad of salivation, lacrimation and perspiration associated with ingestion of these mushrooms is at present the only indication for administration of atropine, once recommended for all forms of mushroom poisoning.

Psilocybin and its congeners are present in all of the mushrooms which are known to produce true hallucinations. These mushrooms of the genera *Psilocybe*, *Paneolus*, *Conocybe* and *Gymnopilus*, are now being sought by some persons as "recreational" mushrooms. Thus far no fatalities have been reported from their use.

Several edible mushrooms are known to interact with ingested ethanol to produce a syndrome similar to that caused by disulfiram with signs of acetaldehydemia. The active substance is a cyclopropanone derivative called coprine, which was simultaneously isolated by two groups of investigators^{5,6} from the "inky cap" *Coprinus atramentarius*. Coprine produces prolonged inhibition of acetaldehyde dehydrogenase in vivo. Although several other mushrooms have been reported to produce a similar syndrome, they have not been shown to contain coprine.

Finally, there is a large and heterogeneous group of mushrooms which, with some regularity, cause either upper or lower gastrointestinal irritation, or both. The toxic principles are unknown, and in many cases, differences or similarities in the clinical syndromes are poorly described and documented. The green-spored mushroom *Chlorophyl-*

lum molybdites is one of these. Detailed reporting is needed among these "minor" poisonings, and the report elsewhere in this issue is a welcome addition to the sparse literature in this area.

Among the mysteries surrounding the minor poisonings is the persistent finding that the same species of mushroom may be toxic to some persons and not to others, toxic at some times and not at others, and toxic at some localities and not at others. Until recently much of the available literature has been from European sources. Yet the toxicity of European species seems to differ from that noted in the same, or closely related mushrooms in North America. Two excellent books on mushroom poisoning have become available.^{7,8} Both accurately summarize what is known and contain much practical information on diagnosis and treatment.

The mushroom clubs and societies and regional poison centers have been instrumental in providing careful toxinomic identification and in collecting detailed reports of toxic episodes. Especially noteworthy have been the efforts of the Puget Sound Mycological Society and the Rocky Mountain Mushroom Club. Gratifying progress has been made but more needs to be done by both physicians and amateur mycologists to advance the current state of knowledge about these minor poisonings. These episodes while usually not fatal can cause a period of grave discomfort and, not infrequently, require admittance to hospital. It is well to remember also that minor illness becomes major in the very young, the very old and the unwell.

LOT B. PAGE, MD
Chief of Medicine
Newton-Wellesley Hospital
Professor of Medicine
Tufts University School of Medicine
Boston

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Medicine by the Decades— Next the 1980's

IT IS SOMETIMES convenient to divide the course of events into blocks of time such as decades or even centuries. Each of the past four decades has been a special time in the evolution of medicine and health care in this nation, and the 1980's seem likely to be no exception.

In retrospect, during the 1940's World War II produced unprecedented clinical advances in medicine, surgery and psychiatry. With the then readily available funds, both accumulated and new scientific knowledge were applied in often dramatic fashion, and the nation was greatly impressed. The 1950's saw an unprecedented and remarkably productive effort in biomedical research also generously supported by the federal government. The results, both real and speculative, were widely publicized as they developed, and the hopes and expectations of the public for better health began to rise. In the 1960's major legislation was enacted to reap the harvest of this biomedical research and to make its real and imagined benefits more readily available to the public. The goal was to assure access to high quality health care to all. Again it was assumed that all that was needed would be another infusion of dollars. But this time the assumption was somewhat less valid. In the 1970's it began to become apparent that a disparity had come into being between what medical science can do and what the nation, through either the public or private sector, can or is willing to afford. The medical profession and indeed the whole health enterprise found themselves caught in harsh pincers of virtually infinite expectations on the one hand and relatively finite resources on the other. The issue focused on costs and the decade was one of tightening and loosing of the federal pincers, the latter occurring as yet another federal initiative proved ineffective. Thus the stage is set for the 1980's.

It is suggested that the decade of the 1980's will also make its distinctive mark. There are already some signs of what this might be. Modern science and technology are having profound impact not only upon medicine and health care, but upon the nation and world. Besides raising more or less infinite aspirations and expectations in a world of finite resources, modern science and